

A NEW SPECIES OF BRYANINOPS (PISCES: GOBIIDAE) WITH NOTES ON NEW RECORDS OF THREE SPECIES OF THE GENUS

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ABSTRACT

A new species of commensal goby, *Bryaninops nexus*, is described from northern Australia and the Ryukyu Islands. This fish hovers, often upside down, among the branches of large staghorn corals (*Acropora*). It is unique in that the nostrils are absent, replaced by a low oval rim. Additional material of four species of *Bryaninops* Smith is reported on; three are new records for Japan.

KEYWORDS: taxonomy, Gobiidae, *Bryaninops*, new species, Australia, Japan, commensal.

INTRODUCTION

The commensal gobies of the genus *Bryaninops* Smith were recently reviewed by Larson (1985). As part of that study, several unusual specimens from Scott Reef, northwestern Australia, and Escape Reef, Queensland, were examined. They greatly resembled *B. erythrops* (Jordan and Seale) but differed in always having the nostrils absent, replaced by an oval low rim, and a very narrow interorbital. They were put aside in the hope that more material might be found so as to determine whether they were aberrant or truly a new species. Twenty-nine additional specimens (from the Great Barrier Reef, northwestern Australia, and the Ryukyu Islands) have been found. Examination of these confirmed that the fish is indeed a new species. It is the "upside-down-swimming goby" first observed among *Acropora* on the northern Great Barrier Reef by Doug Hoese and Bill Gladstone in 1981 (pers. comm.).

Methods of measurement follow Larson and Hoese (1980). An asterisk indicates counts of holotype. Type specimens are deposited in the Academy of Natural Sciences, Philadelphia (ANSP); the Australian Museum, Sydney (AMS); the Northern Territory Museum, Darwin (NTM); the University of the Ryukyus, Okinawa (URM); the Western Australian Museum, Perth (WAM); and the Yokosuka City Museum, Kanagawa (YCM).

SYSTEMATICS

Bryaninops nexus sp. nov. (Figs 1-3)

Cottogobius sp. — Hayashi and Ito 1978: 31, Pl. 6, No. 95.

Tenacigobius sp. — Masuda *et al.* 1984: 284, Pl. 255, N.

Type Material. HOLOTYPE - AMS I. 22618 - 003, 17.5 mm SL ♂, Queensland, Escape Reef Lagoon, among *Acropora* thickets, 10 m depth, D.F. Hoese, November

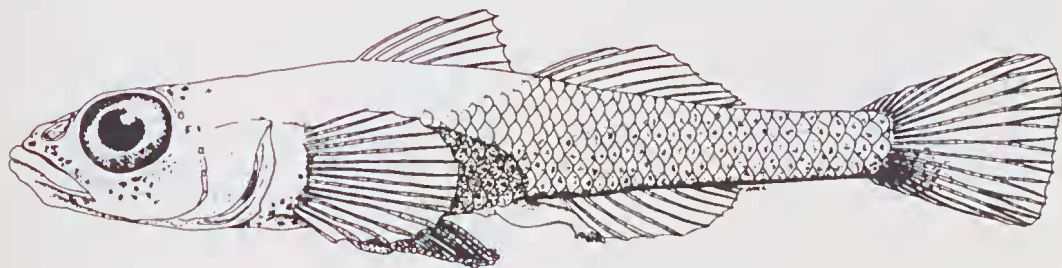


Fig. 1. *Bryaninops nexus* holotype (AMS I. 22618-003), Escape Reef, Queensland.

1981. PARATYPES - QUEENSLAND: AMS I. 22618 - 013, 4 spec. 12.5-17.5 mm SL, same data as holotype; AMS I. 22585-016, 13.5 mm ♀. Escape Reef, 45m depth, G.R. Allen, W. Starck, 30 October 1981; ANSP 158272, 19mm ♂, Endeavour Reef, sand around isolated 3 m high coral knoll, 13 - 18 m depth, J. Tyler, C.L. Smith, 14 January 1969. WESTERN AUSTRALIA: AMS I. 21316 - 003, 8 spec. 11 - 18.5 mm SL, Scott Reef, South Reef lagoon, large staghorn beds on sand, 7 - 10 m, F. Talbot, 20 September 1979; NTM S.11384 - 033, 18 mm ♀, Scott Reef, North Reef, 10 m depth, B.C. Russell, 11 July 1984; WAM P. 28030 - 030, 5 spec. 10.5 - 18.5 mm SL, Rowley Shoals, Clerke Reef, central lagoon basin 2 km S. of Bedwell Reef, 3 - 5 m. G.R. Allen, R. Steene, 11 August 1983; JAPAN: YCM P.4611, 6 spec. 12 - 15.5 mm SL, Ryukyu Islands, Ishigaki-jima, Kabira Bay, M. Hayashi, T. Itoh, 31 July 1978; URM P. 2185, 15.5 mm ♀, Ryukyu Islands, Ishigaki-jima, Sukuji, K. Shimada, 26 July 1980; URM P. 4410, 15.5 mm ♀, Ryukyu Islands, Iriomote-jima, Amitori Bay, on *Acropora formosa*, Y. Yoshino, K. Shimada, 8 September 1982; URM P. 4689, 16.5 mm ♀, Ryukyu Islands, Iriomote-jima, Amitori Bay, on *Acropora formosa*, T. Yoshino, K. Shimada, 9 September 1982.

Diagnosis. A small (up to 18.5 mm SL) slender-bodied species, compressed posteriorly, with large, mostly lateral eyes. Interorbital very narrow (9% of HL). Second dorsal and anal rays usually I, 8. Pectoral rays 15-16, rays unbranched and usually not thickened distally. Body naked anteriorly, mean lateral scale count 37, transverse scale count backward 9. Gill opening reaches to a point below mideye or posterior half of eye. Anterior and posterior nostrils fused, leaving oval area with raised rim. Associated with staghorn corals (*Acropora*).

Description. First dorsal VI (in 30)*. Second dorsal I, 7(in 1); I, 8 (in 28)*. Anal I,7(in 1); I,8(in 28). * Pectoral rays 15 (in 17)*, 16 (in 12). Longitudinal scale count 33 - 41, with a mean of 37 (34 in holotype). Transverse scale count backward 7-12, with a mean of 9*

Segmented caudal rays 17 (in 6), branched caudal rays 11 (in 5). Gillrakers on first arch short, with no spines. Gillrakers on second arch equally short, and with several forwardly-pointing fine spines. Membrane

binding lower limb of first arch to opercular wall reduced. Rakers 2+1+8 (in 3), 1+1+9 (in 1).

Body slender, compressed, more rounded anteriorly. Body depth at anus averages 15% (13.5 - 17.0%) of SL (14.3% in holotype). Head rounded in cross-section, with large eyes occupying most of sides of head and extending into dorsal profile. Head depth about equal to or little less than head width. Eyes average 38% of head length (34.1 - 41.3%), always greater than snout length (which is 25% of head length). Snout narrow, rounded to slightly pointed in dorsal view. Nostrils absent, with low raised roughly oval rim (rim usually highest anteriorly) around area where nostrils should be, formed by remnants of nostril tubes and skin normally covering nasal sac (Figs. 1,2). Mouth terminal, oblique (about 25° to long axis of body), reaching to below anterior half of eye. Lower jaw protrudes a little beyond upper. Tongue usually distinctly trilobed (in 22), weakly trilobed or nearly blunt (in 5), and bilobed in a juvenile specimen. Gill opening wide, reaching to a point below mideye (in 13) or posterior half of eye (in 16)*. Interorbital usually narrow, 9% of head length (13% in holotype, range 7.3 - 13.3%).

Lateral line canals of head as in Fig. 2, with anterior interorbital pores elongate and very close together, pores fused together or with canals around pores open in four specimens. Postorbital canals detached in 15 specimens (connected in one or both sides in six); canal open on one or both sides in five specimens, canals absent in six (in the latter specimens, most head canals open). Sensory papillae reduced (as in other *Bryaninops*), with no scalloping of preorbital or lower preopercular edge (Fig.2).

Body scales reduced anteriorly, reaching no further forward than to below middle of first dorsal fin, usually reaching to below fifth dorsal spine or gap between dorsals, with one to three scales in isolated patch on lateral midline behind pectoral fin. Head and nape always naked.

First dorsal fin triangular, just reaches second dorsal fin origin when depressed. Second to fourth rays longest, subequal. Second dorsal fin short, high anteriorly, low posteriorly. Second dorsal fin rays usually unbranched (but for last), although tips of second to fifth may be branched. Anal fin rays all

unbranched, tips may be covered with thick mucous coating. Pectoral fins short, central rays longest, reaching to above anus. All pectoral rays unbranched, with thickened mucous coating over lower four or five rays. Rays themselves not much thickened distally. Pelvic fins rounded to oval, forming a shallow cup, reaching to anus. Fifth pelvic ray branched once, base of ray not flattened and wide. Branching portions of pelvic rays and pelvic spine lobes thickened, usually finely papillose and folded (lobes especially). Caudal fin roughly truncate, upper lobe slightly longer than lower.

Teeth of males and females similar, but curved caniniform teeth much larger in males. In upper jaw, band of fine pointed teeth present in two or three rows, widest anteriorly, and abruptly narrowing at jaw symphysis. Outer row of eight or ten larger curved teeth across front of upper jaw, posteriormost tooth largest. Lower jaw with similar band of tiny pointed teeth, band about two rows wide at sides and three to five rows wide at front of jaw. Behind band of fine teeth, on either side of jaw symphysis, two canine teeth. At about mid-side of lower jaw, large curved tooth present outside band of fine teeth (lower lip expanded slightly beside tooth), in males. In females, this tooth small, lower lip straight. In some females, side canine not easily distinguished from other teeth at front of lower jaw.

Genital papilla of male conspicuous, slender, elongate, broad at base and rapidly narrowing to tip. Tip expanded, with several fimbriate lobes. Papilla equal to anal spine in height. Female genital papilla robust, cylindrical, short or equal to over half anal spine length in height. Four short lobes behind, and two to four shorter lobes in front of papilla opening, lobes occasionally fimbriate.

Colour in life. Colour slides of living fish at Escape Reef show head and body transpa-

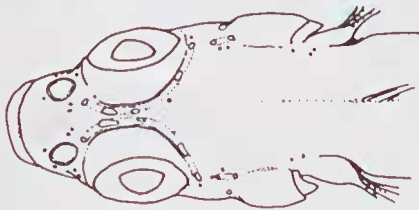


Fig. 2. *Bryaninops nexus* holotype, head, showing nostril area form.

rent, slightly dusky posteriorly. White internal pigment covers brain and along top of vertebral column. Pharynx and peritoneum bright silvery white. Brownish internal pigment fills area from behind eyes to pectoral base and dorsal surface of peritoneum. Streak of dense black pigment extends from posterior part of peritoneum to ventral surface of caudal fin base. Eyes silvery, with narrow red-gold rim. Some reddish pigment visible on snout. Fins clear, with dusky rays. First dorsal fin with faint red-brown pigment markings at base. Caudal slightly dusky.

Masuda *et al.* (1984) illustrate this species in colour (Pl. 255, N) identified as *Tenacigobius* sp.). Their photograph shows four red body bars and a red nape blotch (not visible in slides of living specimen), as well as red-brown pigment on snout and sides of head. Anal fin dusky red, with melanophores concentrated anteriorly. First dorsal dusky red at base. Peritoneum with some iridescent blue showing between the melanophores.

Colour in alcohol. Heavily-pigmented peritoneum shows through body wall as most conspicuous colour marking. Posterior lower half of body variably covered with fine melanophores (remainder of dense black stripe when live). Dense blackish wide streak along base of anal rays and ventral side of caudal peduncle, streak may be dense or diffuse, but always with distinct line of dense pigment along anal base. Breast and sides up to, but not including pectoral base, variably stippled with melanophores. Darkly-pigmented specimens with curved line of melanophores along lower pectoral ray bases. Head with some pigment always present across front of snout, upper lip, and sides of head below eye. Snout and lip markings form distinct broad line from eye to eye in some specimens. Chin and underside of head may or may not be evenly pigmented. Top of head with several irregular blotches behind eyes and over brain. Fins clear but for caudal, which generally shows fine speckling on lower half. No vertical bars visible. Some specimens (usually heavily-marked) with scattered melanophores across base of first dorsal fin membrane, and next to base of second dorsal fin.

Comparison with other species. In the key given by Larson (1985), *B. nexus* will key out as *B. erythrops*, a species it closely resembles in body form, colour and morphometrics.

The two are separated by a combination of characters, as indicated in Table 2. *B. erythropros* may occasionally lack nostrils as does *B. nexus*, and may have a very low rim or a partly formed one (5 out of 32). *B. erythropros* has very variable nostril form, as described by Larson (1985). *B. nexus* appears to be slightly more slender than *B. erythropros* (BDA 15% of SL versus 16%), especially posteriorly (caudal peduncle depth 7.5% of SL versus 8.8%). The eye of *B. nexus* tends to be larger than that of *B. erythropros* (38% of head length versus 32%). The postorbital canal is detached in 60% of *B. nexus* specimens, and detached in 22% of *B. erythropros*. *B. nexus* is always associated with large staghorn *Acropora* colonics, while *B. erythropros* occurs on *Millepora* and *Porites* (branching and knoll-forming) species. There is one lot of specimens examined from the Ryukyus in which both species were apparently obtained from *Acropora formosa*.

When observed underwater, the two species can be distinguished by behaviour and preferred host corals. *B. erythropros* does not hover among coral branches, and leaves them briefly only to select food items.

Ecology. *B. nexus* has been collected at depths ranging from 3-45m, usually from lagoon habitats, in or near staghorn *Acropora* thickets. The fish are unique in that when hovering among or near the coral branches, they are often upside-down (ventral surface upward), with head oriented diagonally downward. Bill Gladstone observed swimming and feeding behaviour of *B. nexus* at Escape Reef, Queensland (pers. comm.). He observed two kinds of feeding behaviour, which the fish appeared to spend equal amounts of time performing. For half the time, the fish picked plankton, in a similar manner to other goby plankton-pickers (except upside-down). The other half of their feeding time was spent clinging to the *Acropo-*

ora branches, darting out to grab a food item then darting back again to the coral branch (similar behaviour to other *Bryaninops*.)

Most collections of this species are probably incomplete, that is, they do not include all specimens associated with a particular colony of *Acropora*, as they are easily lost among the branches. Two lots from Scott Reef and Escape Reef include five males and three females, and four males and one female, respectively. One lot of six specimens from the Ryukyus comprises six females only. All other collections consist only of one or two specimens. Therefore, it is difficult to determine the normal sex ratio for this species (other *Bryaninops* species apparently sex-reverse).

Etymology. From the Latin "nectere", to tie or bind together, referring to the characteristic fused nostril rim.

Bryaninops dianneae Larson

Material. FIJI: NTM S.12003-001, 4 spec. 9-13 mm SL, Suva, Laucala Bay, off green sponge *Haliclona* sp., 14 July 1986, P. Ryan; NTM S.12007-001, 10 spec. 15-25 mm SL, Laucala Bay, off green finger-like sponge, 6-15m, 5-6 January 1987, P. Ryan.

Notes. Apart from the two type specimens, these are the only specimens known. The host sponge collected with the juvenile fish is a *Haliclona* sp. (Family Halicltonidae, Order Haplosclerida), and apparently all the fish seen or collected occur on the same species of sponge (P. Ryan, pers. comm.).

The pelvic fins of these specimens are large (reaching to first few anal rays), flat, not fleshy, without a forwardly-facing fold on the frenum, and with pelvic spine lobes rounded and flattened as described for the types. One 13 mm specimen has a narrow flat forwardly-facing fold on the frenum, two 13 mm and 10 mm fish show only a low indentation while the smallest fish's frenum is completely flat, thin and without rounded lobes around the pelvic spines. The frenum edge is somewhat pointed near each pelvic spine tip in juveniles.

Other counts and measurements are similar to the types (e.g. a wide interorbital, long flattened head, and high scale counts). Lateral scale counts of the 15-25mm long specimens are 40-49, with a mean of 47. In addition, these specimens have very deeply trilobed tongues. The gillrakers of two speci-

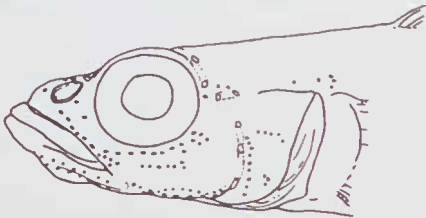


Fig. 3. *Bryaninops nexus*, composite lateral view of head indicating sensory papillae pattern.

mens were quite slender and numerous for this group of gobies (3+1+9). All pectoral rays in juvenile specimens 9-13mm SL are unbranched, with the lower 6 or so rays thickened somewhat distally. Juvenile *Bryaninops* of all species tend to have unbranched pectoral rays.

The formalin-fixed colour pattern of 10 specimens (NTM S.12007-001) was noted as soon as the fish were received. All fish were a translucent light pinkish-orange, with no internal body bars visible. The pectoral base and a stripe along the bases of both dorsals were speckled evenly with dusky pigment. The upper third to half of the body was unpigmented but for the above stripe. The lower half to two-thirds of the body was evenly pigmented with light brown. A very distinct brown stripe extended from eye to eye around snout, including the upper lip and continuing past the eye to over the opercle (where it became very diffuse and indistinct). Behind the eyes and over the brain were scattered brownish blotches. The iris was rose pink, with a margin of gold and black speckles. The caudal fin was clear with a bright orange broad streak on the lower half, and a small indistinct spot at the lower base. Other fins were transparent.

Bryaninops erythropros Jordan and Seale

Material. JAPAN: NTM S. 11784-002, 3 spec. 11-11 SL, Ryukyu Islands, Iriomote-jima, Amitori Bay, off branching *Millepora*

sp., 11 August 1985, H.K. Larson; URM P.2125, 14.5 mm SL ♂, Okinawa, Sesoko-jima, off branching *Porites* sp., 7 June 1980, K. Shimada; out of URM P.4410, 11.5 mm SL ♀, Ryukyu Islands, Iriomote-jima, Amitori Bay, on *Acropora formosa*, 8 September 1982, T. Yoshino, K. Shimada.

Notes. These five specimens represent a new record for Japan. They all have "typical" goby anterior and posterior nostrils (anterior with short tube, posterior with low rim). Previously, only 15% of *B. erythropros* specimens examined had fully-formed nostrils; most specimens having no or only partly-developed nostrils. Specimens with fully-formed nostrils usually occur in ones and twos in a lot of many specimens with no nostrils. Locality, depth, etc. seem to have no correlation with the presence or absence of nostrils. More material from Japan and the Philippines needs to be examined before possession of nostrils can be correlated with this region.

The single specimen collected on *Acropora formosa* is the only record of this species living on any *Acropora* species. The specimen was collected with *B. nexus* by Yoshino and Shimada.

Bryaninops isis Larson

Material. JAPAN: NTM S.11785-001, 13mm SL ♂, Ryukyu Islands, Iriomote-jima, Amitori Bay, on gorgonian *Isis hippuris*, 11 August 1985, H.K. Larson.

Table 1. Measurements (in mm) of *Bryaninops nexus* holotype and some paratypes.

	Holotype AMS I.22618-003	Paratypes AMS I. 22618-013			Paratypes WAM P.28030-030				Paratypes YCM P.4611			
Standard length	17.5	17.0	16.0	12.5	18.5	17.0	15.5	15.0	15.5	15.0	13.5	13.0
Head length	5.4	5.5	4.9	4.6	5.9	5.5	5.1	5.0	4.9	4.6	4.4	4.4
Head depth	2.8	2.9	2.9	2.4	3.0	2.5	2.6	2.5	2.3	2.3	2.1	2.3
Head width	3.1	3.3	3.0	2.4	3.1	3.0	2.7	2.7	2.6	2.6	2.4	2.4
Body depth at anus	2.5	2.5	2.6	1.8	2.9	2.7	2.4	2.2	2.5	2.4	2.3	2.1
Caudal length	3.5	3.6	3.4	2.9	-	3.6	3.2	3.3	3.0	3.0	2.8	-
Pectoral length	3.6	3.3	3.2	2.6	3.8	3.0	3.2	2.0	2.8	2.7	2.8	2.6
Pelvic length	3.4	3.2	2.7	2.4	3.0	2.9	2.7	2.8	2.9	2.9	2.5	2.7
Caudal peduncle length	4.0	3.3	3.5	2.9	4.3	3.9	3.2	3.2	3.5	3.1	2.7	2.8
Caudal peduncle width	1.3	1.2	1.3	1.0	1.4	1.3	1.2	1.2	1.2	1.2	1.0	1.0
Snout length	1.8	1.5	1.3	0.9	1.4	1.3	1.3	1.0	1.2	1.0	1.0	0.9
Eye width	2.0	2.1	1.8	1.6	2.2	2.1	1.9	1.9	1.9	1.9	1.8	1.8
Jaw length	2.3	2.2	2.0	1.6	2.4	2.2	2.1	2.0	1.9	1.8	1.7	1.6
Interorbital width	0.7	0.4	0.4	0.4	0.6	0.3	0.4	0.3	0.4	0.4	0.3	0.3

This specimen represents a new record from Japan. The gorgonian *Isis hippuris* did not seem to be common in Amitori Bay, Iriomote Island.

Bryaninops loki Larson

Material. JAPAN: URM P.2195, 2 spec. 21.5 - 25 mm SL, Okinawa, Kerama Islands, Kuba-jima, 30 m, off *Juuceella* sp., 16 July 1980, K. Shimada; URM P.3177, 23 mm SL ♂, Ryukyu Islands, Iriomote-jima, Barasuto, on unidentified gorgonian, 1 June 1982, T. Yoshino; URM P.8283, 21.5 mm SL ♂, Okinawa, Sesoko-jima, 20 m, off *Juuceella* sp., 13 April 1977, T. Yoshino; NTM S.11787-001, 3 spec. 16-24 mm SL, Ryukyu Islands, Iriomote-jima, Amitori Bay, off Saba Saki Point, 67 m, on seafan, 18 August 1985, H. Kohno; NTM S.11788-001, 2 spec. 16-19.5 mm SL, Shikoku, Uwa Sea, Shirahama Bay, 35 m, on *Ellisella* sp., 10 July 1985, H.K. Larson.

Notes. Three of these additional Japanese specimens are similar in appearance to *B. amplus*, and could be confused with that species. The gill opening is relatively restricted, reaching to just forward of the posterior margin of the preoperculum, and the caudal fin blotch (noted as red to black when live) is absent in preservative. The other six specimens are more typical of *B. loki*. *B. amplus* had the gill opening reaching forward to below the posterior preopercular margin in only 19% of all specimens examined (150). Among the 19%, 5 out of 6 were Japanese specimens, with the other specimens mostly from the Great Barrier Reef (Lizard Island and Decapolis Reef).

B. loki and *B. amplus* can be distinguished in Japan by *B. loki*'s possessing fewer pectoral rays (14-16, usually 14, versus 16-17), and by its gill opening reaching at least forward of the preopercular margin (usually at least halfway between preopercular margin and edge of eye), versus gill opening reaching up to, or slightly forward of the posterior preopercular margin. *B. amplus* usually has higher scale counts (50-60 lateral scales) than *B. loki* (40-50 scales). *B. amplus* is nearly always commensal on *Juuceella fragilis*, and occasionally on *J. juncea* and *Ellisella* species (host not identified to species in some Japanese collections). *B. loki* has been collected from *J. fragilis* only once (in Western Australia), but occurs on *J. gemmacea*, and is often found on *Ellisella quadrilineata* and probably other species, as well as other coelenterates (Larson 1985).

Bryaninops ridens Smith

Material. JAPAN: URM P.2151, 4 spec. 11-13.5 mm SL, Okinawa, Kerama Islands, Agenashiki, 20m depth, off *Pachyseris* sp., 16 July 1980, K. Shimada; URMP.2121, 14.5 mm SL ♀, Okinawa, Sesoko-jima, 4 m depth, off *Millepora* sp., 4 July 1980, K. Shimada; NTM S.11783-001, 4 spec. 13-14 mm SL, Ryukyu Islands, Iriomote-jima, Amitori Bay, 4m depth, off branching *Millepora* sp., 11 August 1985, H.K. Larson; NTM S.11784-001, 3 spec. 11-13.5 mm SL, Ryukyu Islands, Iriomote-jima, Amitori Bay, 6 m depth, off branching *Millepora*, 11 August 1985, H.K. Larson.

Notes. These 12 specimens represent a new record from Japan. The lateral scale

Table 2. Characters separating *Bryaninops erythroptis* and *B. nexis*.

	<i>B. erythroptis</i>	<i>B. nexis</i>
Nostrils and nasal sac	Sometimes absent	Always absent
Remnant rim around absent nostril area	Sometimes present or incomplete	Always present
Nostrils completely developed	Sometimes incomplete	Always absent
Pectoral ray count	14-15 (usually 14)	15-16 (never 14)
Mean interorbital width	8.8% of head length	12.4% of head length
Gill opening extent	To posterior edge or posterior half of eye	Below mid eye or posterior half of eye
Mean lateral scale count	41	37
Extent of scales	To above pectoral base, or to first few dorsal spines	To between dorsals, or up to mid first dorsal

counts are high for the species (average 33 scales, with the highest count previously known being 37). In these Japanese specimens, 3 have 37 lateral scales, 1 has 38, 1 has 39, 2 have 43 and 1 has 45. The specimens with high counts are not more fully scaled, but have smaller scales. The lateral scales in these specimens extend up to below the 5th or 6th dorsal spines (with a few scattered scales isolated far forward), as do those on fish from other localities. In the specimen with 45 lateral scales, the scales reach forward to below the fourth dorsal spine, with several scales scattered anteriorly near pectoral axil. Other counts and characters are similar to those in fish from other localities.

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